

REMARKS/ARGUMENTS

The Office Action August 12, 2004, has been received and reviewed. Claims 1 through 44 are currently pending in the application. Claims 1 through 44 stand rejected. Applicant has amended claims 1, 2, 6 through 14, 32, and 40 to clarify the invention with respect to the prior art and not to narrow the scope of the claims, and respectfully requests reconsideration of the application as amended herein.

Information Disclosure Statement(s)

Applicant notes the filing of an Information Disclosure Statement herein on August 18, 2003, and notes that no copy of the PTO-1449 was returned with the outstanding Office Action. Applicant respectfully requests that the information cited on the PTO-1449 be made of record herein and an initialed copy of the PTO-1449 be returned to Applicant's undersigned attorney evidencing the same. A copy of the PTO-1449 and a date-stamped copy of the transmittal postcard evidencing receipt of the same by the Office are enclosed for the Examiner's reference.

35 U.S.C. § 102(e) Anticipation Rejections

Anticipation Rejection Based on U.S. Patent No. 6,427,353 to Nelson et al.

Claims 1 through 7, 9, 10, 13, 14, 17 through 19, 21, 27, 28, and 30 through 44 stand rejected under 35 U.S.C. § 102(e) as being anticipated by Nelson et al. (U.S. Patent No. 6,427,353). Applicant respectfully traverses this rejection, as hereinafter set forth.

A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference. *Verdegaal Brothers v. Union Oil Co. of California*, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). The identical invention must be shown in as complete detail as is contained in the claim. *Richardson v. Suzuki Motor Co.*, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989).

Nelson discloses a dimensional measuring apparatus 10 having a part fixture 12 with two V-supports 14 which serve to support work piece 16. A plurality of probes 18 are positioned so as to be able to contact work piece 16 at appropriate locations for simultaneously measuring the parameters of work piece 16. (FIG.1, Col. 4, lines 55-63) The software associated with control unit 22 captures a voltage signal which is proportional to the physical position of the probes 18.

Each probe 18 is maintained in continuous contact with the work piece 16. (Col. 5, lines 16-26) An alternative embodiment of the support structure or fixture may be seen in FIG. 3. The support structure includes end supports 50 positioned to hold the work piece 16 in position to be dimensionally measured by probes 18. This configuration allows for ease in rotation of the work piece 16 about its longitudinal axis 52. (Col. 5, lines 65-68-Col. 6, lines 1-4) FIGS. 4 and 5 show another alternative fixture 56 designed so that a work piece 54 may be placed within the fixture 56 and be allowed a small translational movement. The clearance 58, shown in FIG. 5, allows for the work piece 54 to move translationally within the fixture 56. (Col. 6, lines 6-19)

Claim 1, as amended herein, recites, “An apparatus for determining at least one dimensional value of a substantially planar substrate, comprising: a carrier configured for *holding and positioning a substantially planar substrate* in a plane, the substantially planar substrate having *first and second substantially planar opposed surfaces* parallel to the plane; a first linear measuring device including *a first movable caliper finger* disposed on one side of the plane *for measuring a first linear distance from a zero point* to the first surface of the substrate *along an axis substantially normal to the first and second surfaces*; and a second linear measuring device including a second movable caliper finger disposed on an opposing side of the plane *for measuring a second linear distance from the zero point* to the second surface of the substrate along the axis generally normal to the first and second surfaces, the second movable caliper finger being coaxial with the first movable caliper finger.” emphasis added. Nelson fails to disclose an apparatus wherein a carrier is configured for *holding and positioning a substantially planar substrate* in a plane, the substantially planar substrate having first and second substantially planar opposed surfaces parallel to the plane, and including a first linear measuring device including a first movable caliper finger disposed on one side of the plane *for measuring a first linear distance from a zero point to the first surface of the substrate along an axis substantially normal to the first and second surfaces*. Rather, Nelson discloses fixtures 12, 50, 56 configured for holding a substantially *cylindrical* work piece 16, 54. (See FIGS. 1, 3-5). Work piece 16, 54 may be *rotated* about its longitudinal axis 52, and probes 18, 60, 62, 64, 66, 70, 72, 74, and 76 contact the surfaces of work piece 16, 54 and define the inner diameter and the outer diameter of the work piece 16, 54. The fixtures of Nelson are not configured for holding and positioning a substantially planar substrate in a plane.

Nelson further fails to disclose a first movable caliper finger for measuring a first linear distance from a zero point and a second movable caliper finger disposed on an opposing side of the plane for measuring a second linear distance from the zero point. Rather, Nelson discloses a plurality of probes positioned for simultaneously measuring the parameters of a work piece. The software associated with control unit captures a voltage signal which is proportional to the physical position of the probes. Therefore, Applicants respectfully submit that Nelson does not disclose each and every element of claim 1, as amended herein.

Claims 2-7, 9-10, and 13-14 are each allowable, among other reasons, as depending from claim 1 which should be allowed.

Claim 3 is further allowable because Nelson fails to disclose first and second linear measuring devices configured to *provide a zero point value* as a linear distance for each of the first and second movable caliper fingers *with the terminal contact members in axial contact with each other* for use by the calculation device in calculating the first and second linear distances. Rather, Nelson discloses that each probe 18 is maintained in continuous contact with the work piece 16. Col. 5, lines 24-26.

Claim 4 is additionally allowable because Nelson fails to disclose contact members comprising one of smooth-surfaced enlargements at the terminal ends of the caliper fingers, unidirectional rollers and multidirectional roller balls. Rather, Nelson discloses pointed probes 18, see FIG. 3.

Claim 7 is additionally allowable because Nelson fails to disclose a carrier configured to move the substantially planar substrate in at least one linear direction parallel to the plane. Rather, Nelson discloses fixtures configured for holding a substantially cylindrical work piece which may be rotated about its longitudinal axis.

Claim 9 is additionally allowable because Nelson fails to disclose an apparatus configured to measure the first linear distance and the second linear distance from the zero point. Nelson further fails to disclose measuring in at least three different locations on the first and second surfaces of the substantially planar substrate in association with movement of the substantially planar substrate by the carrier in the at least one direction. Rather, Nelson discloses fixtures configured for holding a substantially cylindrical work piece which may be rotated about its longitudinal axis. Some clearance within the fixture allows a small translational movement of the work piece while still having constrained limits of motion.

Claim 10 is additionally allowable because Nelson fails to disclose a calculation device configured to determine at least one *warpage* characteristic of the *substantially planar* substrate from at least some of the measurements at the at least three different locations. Nelson discloses only using position data from the probes to determine the inner diameter, outer diameter, thickness, concentricity of the inner and outer surface circles, and center of a substantially cylindrical work piece. (Col. 6, lines 37-49, FIGS. 4-5)

Claim 10 is additionally allowable because Nelson fails to disclose a calculation device configured to determine at least one *warpage* characteristic of the *substantially planar* substrate from at least some of a plurality of first and second linear distance measurements taken along a line of contact with the substantially planar substrate by the first and second movable caliper fingers. Nelson discloses only using position data from the probes to determine the inner diameter, outer diameter, thickness, concentricity of the inner and outer surface circles, and center of a substantially cylindrical work piece. (Col. 6, lines 37-49, FIGS. 4-5)

Independent claim 17 recites, “at least one complementary set of linear measuring devices is configured to provide a zero point value as a linear distance for each movable caliper finger with contact members of the first and second coaxial, opposing, movable caliper fingers in mutual contact defining a zero point and to provide displacement values for each movable caliper finger when displaced away from the zero point.” Nelson fails to disclose movable caliper fingers *in mutual contact* defining a zero point. Rather, the apparatus of Nelson includes probes, and software that captures a voltage signal which is proportional to the physical position of the probes. (Col. 5, lines 16-18). The first probe determines position P1 and the second probe determines position P2, the center point between the two probe positions is $(P1-P2)/2$. (Col. 3, lines 48-51) Each probe of Nelson is maintained in continuous contact with the work piece. Col. 5, lines 24-26. Therefore, Applicants respectfully submit that Nelson does not disclose each and every element of claim 17.

Claims 18-19, 21, 27-28, and 31-32 are each allowable, among other reasons, as depending from claim 17 which should be allowed. No basis was provided for the rejection of claims 22 and 23, however, they are also each allowable, among other reasons, as depending from claim 17.

Claim 21 is additionally allowable because Nelson fails to disclose an apparatus wherein contact members comprise smooth-surfaced enlargements at the terminal ends of the movable caliper fingers, unidirectional rollers or multidirectional roller balls. Rather, Nelson discloses

pointed probes 18, see FIG. 3.

Claim 22 is additionally allowable because Nelson fails to disclose an apparatus configured to cause the linear measuring devices to provide displacement values from the zero point value in at least three different locations on the substantially planar substrate *responsive to movement of the substantially planar substrate in the at least one direction*. Rather, Nelson discloses fixtures configured for holding a substantially cylindrical work piece which may be rotated about its longitudinal axis. Some clearance within the fixture allows a small translational movement of the work piece while still having constrained limits of motion.

Claim 23 is additionally allowable because Nelson fails to disclose an apparatus configured to determine at least one *warpage* characteristic of the *substantially planar* substrate from at least some of the displacement values for the at least three different locations. Nelson discloses only using position data from the probes to determine the inner diameter, outer diameter, thickness, concentricity of the inner and outer surface circles, and center of a substantially cylindrical work piece. (Col. 6, lines 37-49, FIGS. 4-5)

Claim 28 is additionally allowable because Nelson fails to disclose a device for receiving zero point values and displacement values and calculating at least one dimensional value associated with the substantially planar substrate configured to determine at least one *warpage* characteristic of the *substantially planar* substrate from at least some of a plurality of displacement values taken along a line of contact with the substantially planar substrate by the movable caliper fingers. Nelson discloses only using position data from the probes to determine the inner diameter, outer diameter, thickness, concentricity of the inner and outer surface circles, and center of a substantially cylindrical work piece. (Col. 6, lines 37-49, FIGS. 4-5)

Claim 31 is additionally allowable because Nelson fails to disclose a carrier for holding, positioning and moving a substantially planar substrate in at least one direction parallel to a plane perpendicular to movable caliper fingers, and a plurality of complementary sets of linear measuring devices *mutually spaced along the plane* transversely to a direction of intended movement of the substantially planar substrate by the carrier. Rather, Nelson discloses a plurality of probes for dimensionally measuring a work piece rotated about its longitudinal axis.

Independent claim 32, as amended herein, recites, “establishing a plane parallel to which a substantially planar substrate is to be disposed; establishing a zero point location in or immediately adjacent the plane from which first and second opposing linear distances perpendicular to the plane may be measured; *placing the substantially planar substrate parallel*

to the plane and with the zero point location located within the substantially planar substrate; and measuring the first and second opposing linear distances from the zero point location to each of two opposing substantially planar sides of the substantially planar substrate in at least one location on the substantially planar substrate.” Emphasis added.

Nelson fails to disclose a method for determining at least one dimensional value of a substantially planer substrate including establishing a plane parallel to which a substantially planar substrate is to be disposed. Rather, Nelson discloses a method for acquisition of the dimensional parameters of a substantially cylindrical work piece. Nelson fails to disclose establishing a zero point location, and placing the substantially planar substrate with the zero point location located within the substantially planar substrate. Rather, Nelson discloses probes which define a surface location on the work piece by converting the physical location to a signal during rotational movement of the work piece. The probes of Nelson contact the curved outer surfaces of a substantially cylindrical work piece. (See FIGS. 3-5). Nelson further fails to disclose measuring the first and second opposing linear distances from the zero point location to each of two opposing substantially *planar sides* of the substantially planar substrate in at least one location on the substantially planar substrate. Rather, the probes of Nelson are positioned to contact the curved outer surfaces of a substantially cylindrical work piece to obtain dimensional characteristics. Therefore, Applicants respectfully submit that Nelson does not disclose each and every element of claim 32.

Claims 33-44 are each allowable, among other reasons, as depending from claim 32 which should be allowed.

Claim 35 is additionally allowable because Nelson fails to disclose determining any warpage of the substantially planar substrate. Nelson discloses only using position data from the probes to determine the inner diameter, outer diameter, thickness, concentricity of the inner and outer surface circles, and center of a substantially cylindrical work piece. (Col. 6, lines 37-49, FIGS. 4-5) Nelson fails to disclose establishing a zero point location, therefore Nelson further fails to disclose comparing differences in at least some of the opposing, measured first and second linear distances from the zero point locations at different locations of the plurality of predetermined locations.

Claim 36 is additionally allowable because Nelson fails to disclose determining any warpage of the substantially planar substrate by comparing differences in measured first linear distances from the zero point location at the different locations of the plurality of predetermined

locations. Nelson discloses only using position data from the probes to determine the inner diameter, outer diameter, thickness, concentricity of the inner and outer surface circles, and center of a substantially cylindrical work piece. (Col. 6, lines 37-49, FIGS. 4-5)

Claim 38 is additionally allowable because Nelson fails to disclose measuring the first and second opposing linear distances from the zero point location to each of two opposing substantially planar sides of the substantially planar substrate in at least some predetermined locations spaced along a longitudinal extent of the substantially planar substrate, adjacent a longitudinal edge of the substantially planar substrate. Nelson fails to disclose a substantially planar substrate, therefore Nelson fails to disclose measuring linear distances at locations spaced adjacent a longitudinal edge of the substantially planar substrate. The cylindrical work piece of Nelson has no longitudinal edges.

Claim 39 is additionally allowable because Nelson fails to disclose selecting at least some of the predetermined locations of the plurality to be spaced along a longitudinal extent of the substantially planar substrate, and selecting at least one other location of the plurality on the substantially planar substrate to be spaced laterally from the at least some of the predetermined locations.

Claim 40, as amended herein, is additionally allowable because Nelson fails to disclose the plurality of predetermined locations comprising a substantially continuous path extending longitudinally across at least a portion of the substantially planar substrate. Nelson discloses rotating a work piece, and using probes to obtain dimensional characteristics of the work piece. When the work piece has been rotated a predetermined amount, the probes may once again perform measurements on the work piece. (Col. 6, lines 64-66)

Claim 42 is additionally allowable because Nelson fails to disclose establishing the zero point location as a location of mutual contact of the first and second opposing elements without interposition of the substantially planar substrate therebetween. The probes of Nelson maintain continuous contact with the work piece (Col. 5, lines 23-25). Nelson fails to disclose probes having a location of mutual contact.

Claim 44 is additionally allowable because Nelson fails to disclose passing a substantially planar substrate between first and second opposing elements.

35 U.S.C. § 103(a) Obviousness Rejections

Obviousness Rejection Based on U.S. Patent No. 6,427,353 to Nelson et al.

Claims 8, 11, 12, and 24 through 26 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Nelson et al. (U.S. Patent No. 6,427,353). Applicant respectfully traverses this rejection, as hereinafter set forth.

M.P.E.P. 706.02(j) sets forth the standard for a Section 103(a) rejection:

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or combine reference teachings. Second, there must be a reasonable expectation of success. Finally, **the prior art reference (or references when combined) must teach or suggest all the claim limitations.** The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). (Emphasis added).

The 35 U.S.C. § 103(a) obviousness rejections of claims 8, 11, 12, and 24 through 26 are improper because, among other reasons, the claims depend from independent claim 1 or independent claim 17, which should each be allowed.

Claim 8 is additionally allowable because Nelson fails to teach or suggest a carrier configured to move the substantially planar substrate in a plurality of directions within a plane, the substantially planar substrate having first and second substantially planar opposed surfaces parallel to the plane. Nelson teaches fixtures configured for holding a substantially *cylindrical* work piece, and rotating the work piece about its longitudinal axis. Some clearance within the fixture allows a small translational movement of the work piece while still having constrained limits of motion. There is no suggestion or motivation to modify the fixture of the Nelson reference to hold a substantially planar substrate, or to move a substantially planar substrate in a plane, or in a plurality of directions within a plane. Therefore, Nelson cannot and does not establish a *prima facie* case of obviousness under 35 U.S.C. § 103 regarding claim 8.

Claim 11 is additionally allowable because Nelson fails to teach or suggest an apparatus configured to measure the first linear distance and the second linear distance from the zero point in at least three different locations on the first and second surfaces of the substantially planar

substrate in association with movement of the substantially planar substrate by the carrier in the plurality of directions.

Claim 12 is additionally allowable because Nelson fails to teach or suggest a calculation device configured to determine at least one warpage characteristic of the substantially planar substrate from some of the at least three first and second linear distance measurements.

Claim 24 is additionally allowable because Nelson fails to teach or suggest a carrier configured to move the substrate in a plurality of directions parallel to a plane, the plane perpendicular to movable caliper fingers.

Claim 25 is additionally allowable because Nelson fails to teach or suggest an apparatus configured to cause the linear measuring devices to provide displacement values from the zero point value in at least three different locations on the substantially planar substrate responsive to movement of the substantially planar substrate in the plurality of directions.

Claim 26 is additionally allowable because Nelson fails to teach or suggest a device for receiving zero point values and displacement values and calculating at least one dimensional value associated with the substantially planar substrate, the device configured to determine at least one warpage characteristic of the substrate from at least some of the displacement values for the at least three different locations.

Obviousness Rejection Based on U.S. Patent No. 6,427,353 to Nelson et al. in View of U.S. Patent No. 5,883,313 to Ercole et al.

Claims 16 and 29 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Nelson et al. (U.S. Patent No. 6,427,353) in view of Ercole et al. (U.S. Patent No. 5,883,313). Applicant respectfully traverses this rejection, as hereinafter set forth.

Claims 16 and 29 are each allowable, among other reasons, as depending from claims 1 and 17, respectively, which should each be allowed.

Obviousness Rejection Based on U.S. Patent No. 6,427,353 to Nelson et al. in View of U.S. Patent No. 4,687,979 to Ashton et al.

Claims 15 and 20 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Nelson et al. (U.S. Patent No. 6,427,353) in view of Ashton et al. (U.S. Patent No. 4,687,979). Applicant respectfully traverses this rejection, as hereinafter set forth.

Claims 15 and 20 are each allowable, among other reasons, as depending from claims 1 and 17, respectively, which should each be allowed.

ENTRY OF AMENDMENTS

The amendments to claims 1, 2, 6 through 14, 32, and 40 above should be entered by the Examiner because the amendments are supported by the as-filed specification and drawings and do not add any new matter to the application.

CONCLUSION

Claims 1 through 44 are believed to be in condition for allowance, and an early notice thereof is respectfully solicited. Should the Examiner determine that additional issues remain which might be resolved by a telephone conference, he is respectfully invited to contact Applicant's undersigned attorney.

Respectfully submitted,



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Date: November 5, 2004

KLD/nj:rmh

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03944 U.S. PTO

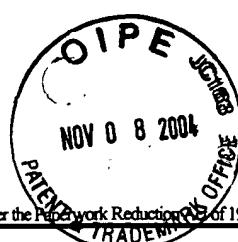
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08/18/03

Invention: METHOD AND APPARATUS FOR MEASUREMENT OF THICKNESS AND WARPAGE OF SUBSTRATES
Applicant(s): Rodney L. Kirstine
Filing Date: August 18, 2003
Serial No.: Not Yet Assigned
Date Sent: August 18, 2003 via Express Mail Label No. EV326921897US
Docket No.: 2269-5659US
JAW/ljb

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(use as many sheets as necessary)

Sheet

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<i>Complete if Known</i>	
Application Number	Not Yet Assigned
Filing Date	August 18, 2003
First Named Inventor	Rodney L. Kirstine
Group Art Unit	Unknown
Examiner Name	Unknown
Attorney Docket Number	2269-5659US (02-1364.00/US)

U.S. PATENT DOCUMENTS

FOREIGN PATENT DOCUMENTS

Examiner Signature		Date Considered	
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***EXAMINER:** Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

¹ Applicant's unique citation designation number (optional). ² See Kinds Codes of USPTO Patent Documents at www.uspto.gov or MPEP 901.04. ³ Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). ⁴ For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. ⁵ Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST. 16 if possible. ⁶ Applicant is to place a check mark here if English language Translation is attached.

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